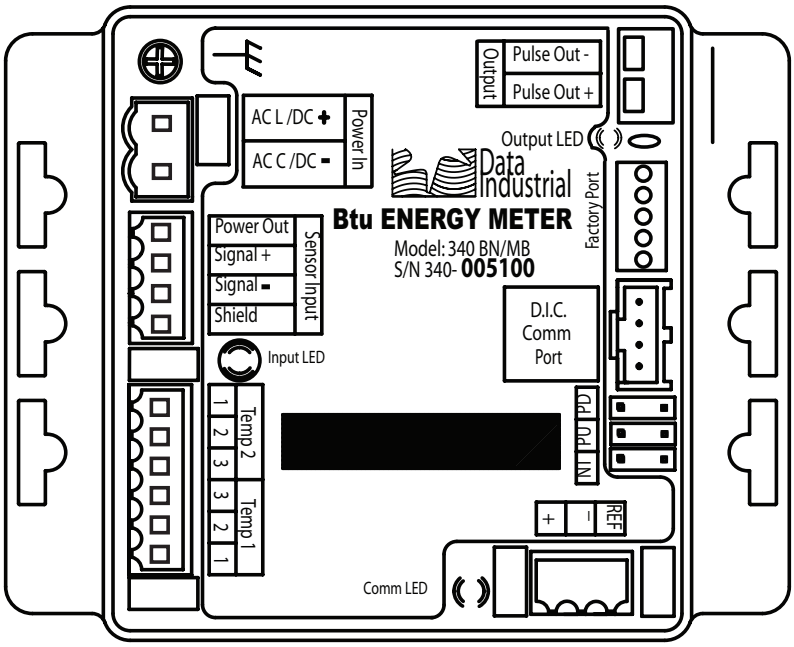
Badger Meter

Series 340 BN/MB Btu Transmitter

Hydronic Energy Transmitter with RS-485 BACnet™ & Modbus® and Scaled Pulse Output



IMPORTANT:
This manual contains important information.
READ AND KEEP FOR REFERENCE.

PN: 872035 (3-11)

Installation & Operation Manual

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Introduction

The Badger Meter Series 340 BN/MB Btu transmitter is an economical, compact device for hydronic sub-metering applications. It utilizes an RS-485 connection for Modbus® and BACnet™ communication protocols and a solid state switch for pulse output representing either flow or energy.

The Series 340 BN/MB calculates thermal energy by integrating the liquid flow in a closed pipe system and the differential temperature between the supply and return. The Series 340 BN/MB requires one flow sensor and two temperature sensors.

The temperature sensors can be two-wire 10 kΩ Type II Thermistors or 100 or 1000 Ohm RTDs that follow the IEC 751 curve.

The flow input may be provided by many of the Badger Meter line of flow sensors and other manufacturers' devices that generate pulses or sine waves.

The onboard microprocessor and digital circuitry make precise measurements and produce accurate drift-free output. The Series 340 BN/MB is programmed using the Badger Meter Windows® software and a Badger Meter Model A301 programming cable. Calibration information for the flow sensor, units of measurement, communication protocol settings, and output scaling may be downloaded prior to installation or in the field.

The RS-485 Modbus settings include Baud Rate, Address and RTU/ASCII.

The RS-485 BACnet is a MS/TP Slave device and includes address, Baud Rate, DeviceName, Device Instance Number and Max Master Valve.

While the unit is connected to a PC or laptop computer real-time flow rate, flow total, both temperature readings, energy rate, and energy total are available.

The Series 340 BN/MB transmitter features three LED's to indicate flow sensor activity, RS-485 activity, and the pulse output.

The Series 340 BN/MB transmitter has an isolated solid state switch closure that is user programmed for units of energy or flow. The output pulse width is adjustable from 10 mS to 5 sec.

The Series 340 BN/MB Btu transmitter operates on AC or DC power supplies ranging from 12 to 24 volts.

The compact cast epoxy body measures 3.65"(93mm) x 2.95"(75mm) and can be easily mounted on panels, DIN rails or enclosures.

Installation

Mechanical installation

The Series 340 BN/MB transmitter may be surface mounted onto a panel, attached to DIN rails using adapter clips or wall mounted using two optional enclosures.

Location

Although the Series 340 BN/MB device is encapsulated, all wiring connections are made to exposed terminals. The unit should be protected from weather and moisture in accordance with electrical codes and standard trade practices.

In any mounting arrangement, the primary concerns are ease of wiring and attachment of the programming cable.

The unit generates very little heat so not consideration need be given to cooling or ventilation.

Surface Mount Installation

The Series 340 BN/MB may be mounted to the surface of any panel using double sided adhesive tape or by attaching fasteners through the holes in the mounting flanges of the unit.

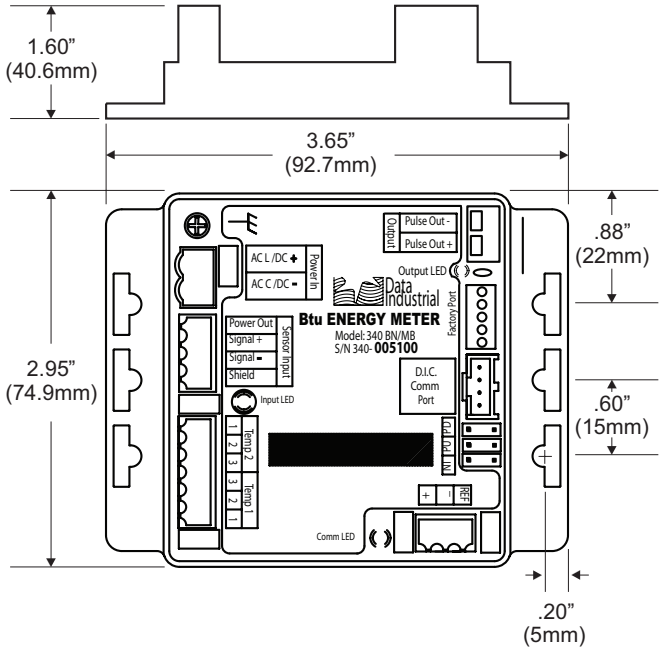


Figure 1: Series 340 Dimensions

Wall Mounting

Optional metal and plastic enclosures are available to mount the Series 340 BN/MB to a wall when no other enclosure is used. The enclosure is first attached to the wall using fasteners through its mounting holes.

After wiring, the transmitter may be attached to the enclosure with the terminal headers facing in using the slots in the mounting flanges. As an alternate mounting arrangement, the Series 340 BN/MB may be fastened to the box cover using double-sided adhesive tape.

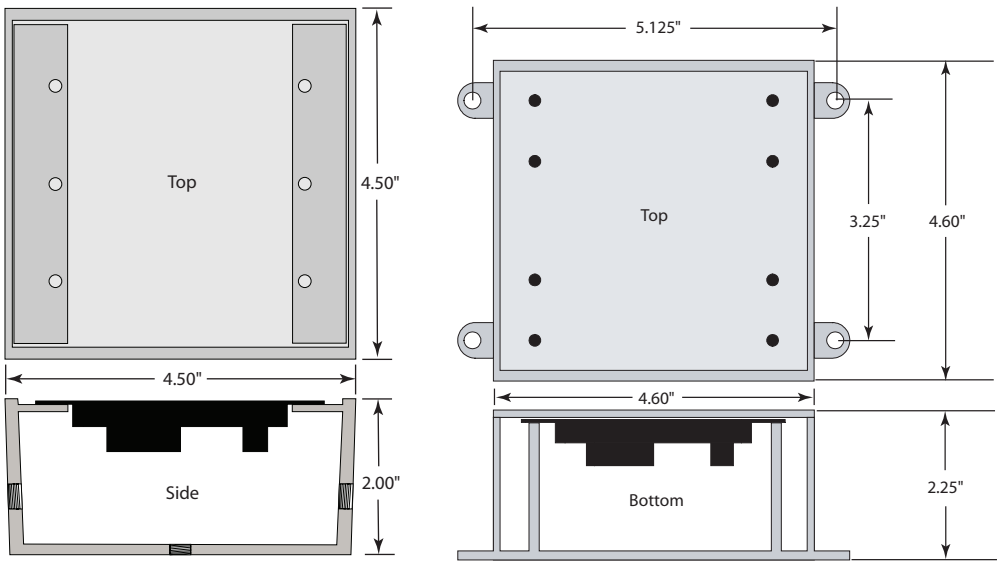


Figure 2: 340 Metal (left) and Plastic (right) Box Dimensions

Din Rail Mounting

Optional clips snap onto the mounting flanges allowing the Series 340 BN/MB to be attached to DIN 15, 32, 35 mm DIN rail systems.

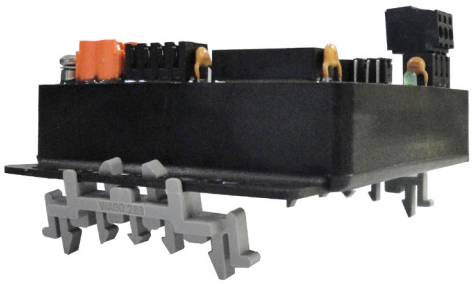


Figure 3: Din Rail Mounting

Temperature Sensor Installation

Badger offers several styles of 10k Thermistors and 100 Ohm Platinum RTDs in both direct immersion and Thermowells. The style selected depends on system requirements and pipe size.

Direct Insert

Generally for smaller pipe sizes direct insert sensors are used.

Figure 4: Direct Insert

Thermowell

For larger pipes that are more difficult to drain for service, thermowells are recommended.

Figure 5: Thermowell

Hot Tap

For pipes that cannot be drained even for initial installation, we offer a Hot Tap version.

Model THT – available as 10k Thermistor version only.

Figure 6: Hot Tap

Electrical Installation

All connections to the Badger® Series 340 BN/MB are made to screw terminals on removable headers.

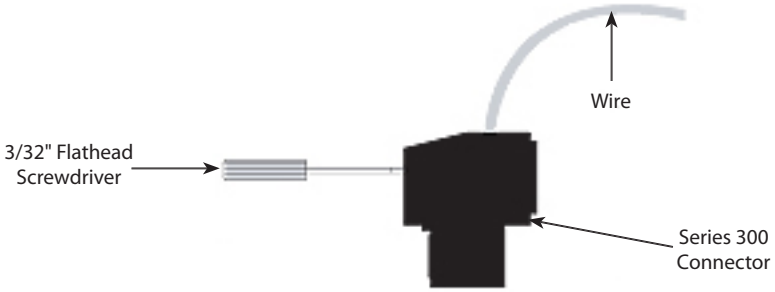


Figure 7: Side View - Typical 300 Series Removable Connector Wiring

Power Supply Wiring

The Series 340 BN/MB requires 12-24 Volts AC or DC to operate. The power connections are made to the ORANGE header. The connections are labeled beside the header. Observe the polarity shown on the label.

If a Badger Meter plug-in type power supply (Model A-1026 or A-503) is used, connect the black/white striped wire to the terminal marked positive (+) and the black wire to the terminal marked negative (-).

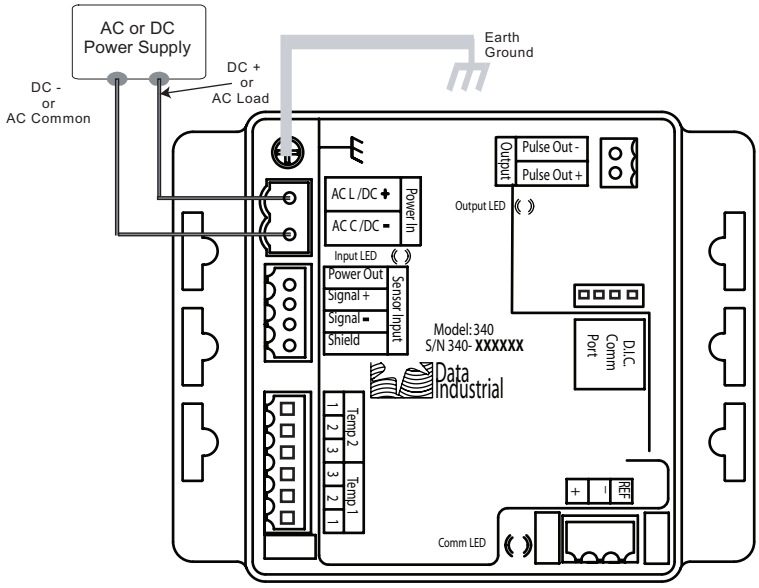


Figure 8: Sample Power Supply Wiring

NOTE: Included with every Series 340 BN/MB is a 340IK kit containing a screw, lock washer and nut to connect the Series 340 BN/MB to earth ground. Connect the earth ground lug of the Series 340 BN/MB to a solid earth ground with as short a wire as possible. This will help prevent electrical interference from affecting the Series 340 BN/MB's normal operation.

Sensor Wiring

All flow sensor types connect to the four terminal headers labeled "Sensor Input".

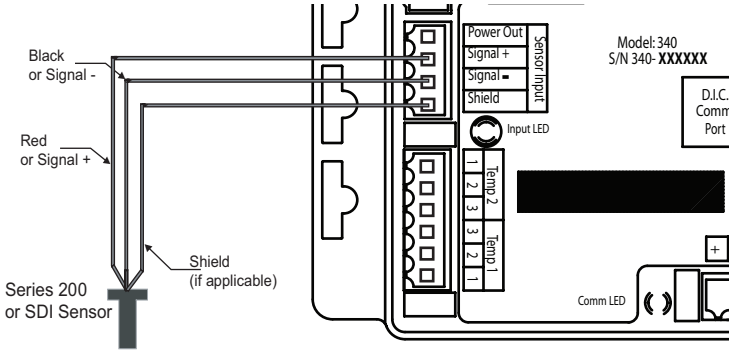


Figure 9: Sample Sensor Wiring Diagram

200 Series

Connect the red wire to sensor signal (+), black wire to sensor signal (-) and the bare wire to shield.

SDI Series

Connect the plus (+) terminal of the sensor to sensor signal (+) on the transmitter and the minus (-) terminal of the sensor to sensor signal (-) on the transmitter. Connect the shield terminal of the sensor to the shield terminal of the transmitter.

Other Flow Sensors

The sensor input Power Out terminal supplies nominal 12V DC excitation voltage for 3 wire sensors. Connect sensor signal + and sensor signal - wires to transmitter terminals.

The 340BN/MB is very versatile, and can accept both Pulse and Zero Crossing Sine Wave flow sensors. Excitation voltage is also provided for Three Wire Powered Sensors (Example: Hall Effect, of Badger 4000 Series).

See the Programming Section for configuration instructions.

Temperature Element Wiring

Appropriate wire types and proper shielding is required for accurate temperature readings.

Since Btu calculations are based on Delta T cable, in order to maintain a balanced system, T1 and T2 wire runs should be kept to approximately the same length, and no to exceed 500 feet.

Thermistors

Badger Meter thermistors are not polarity-sensitive, therefore, wire color is unimportant. The thermistor located in the same pipe as the flow sensor, termed temperature sensor T1, should be connected to terminals 2 and 3 on terminal block Temp 1. The thermistor located other pipe, termed temperature sensor T2, should be connected to terminals 2 and 3 on terminal block Temp 2. As shown in the thermistor wiring diagram, a jumper must be installed between terminals 1 and 3 for both the T1 and T2 input terminals. These terminals 1 and 3 are used for lead resistance compensation when 100 three wire RTDs are used, and must be jumpered when not used.

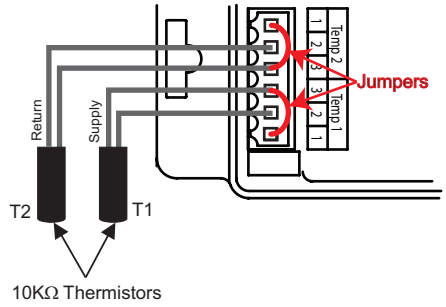


Figure 10: Thermistor Wiring Diagram

Resistance Temperature Detectors (RTDs)

Badger Meter RTDs are three-wire devices. Two of the wires are the same color, and interchangeable. One wire is current-carrying and connects to terminal #3, and the other is used for lead compensation and is connected to terminal #1. The single color lead is attached to terminal 2. The RTD located in the same pipe as the flow sensor, termed temperature sensor T1, should be connected to terminal block Temp 1. The RTD located in the other pipe line, termed temperature sensor T2, should be connected to terminal block Temp 2.

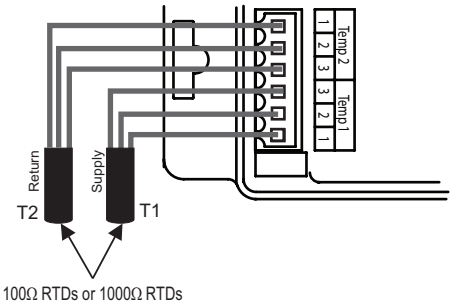


Figure 11: RTD Wiring Diagram

Pulse Output Wiring

The Badger Meter Series 340 BN/MB has solid state switch output rated for a maximum sinking current of 100 mA @ 36V DC. In most cases the pulse out (+) terminal of the Series 340 BN/MB will connect to the input pulse (+) and the pulse out (-) terminal to the input pulse (-) of the receiving device. Although labeled +/-, the pulse output is not actually polarity sensitive, and can switch low level AC loads if required.

These terminals are located on a separate two terminal removable header on the Series 340 BN/MB labeled "Output".

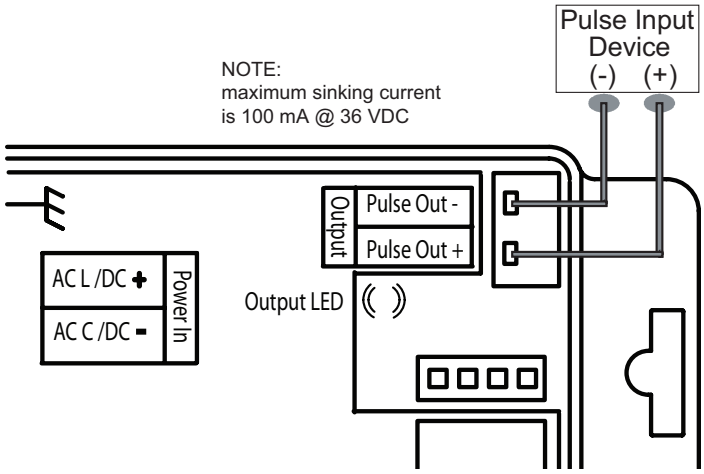


Figure 12: Sample Pulse Output Wiring Diagram

Connecting the RS-485 Buss

As shown in the Sample Wiring Diagram, the position of jumpers on each 340MB/BN transmitter and wiring between each 340MB transmitter and the RS-485 network are different depending on where the transmitter is installed, i.e. its nodal position. For all but the final 340MB transmitter in a string, the three jumpers NT, PU, and PD should be in the open position, and only the (+) and (-) network terminals should be connected to the RS-485 buss. For the final 340MB transmitter in a Modbus network, the three jumpers NT, PU, and PD should be in the closed position, and all three network terminals (+), (-), and REF should be connected to the Modbus buss.

> **NOTE:** The Model 340MB/BN transmitter default Modbus or BACnet polling address must be changed before it is introduced into an existing network to avoid possible address conflicts. Please refer to programming instructions in the previous section.

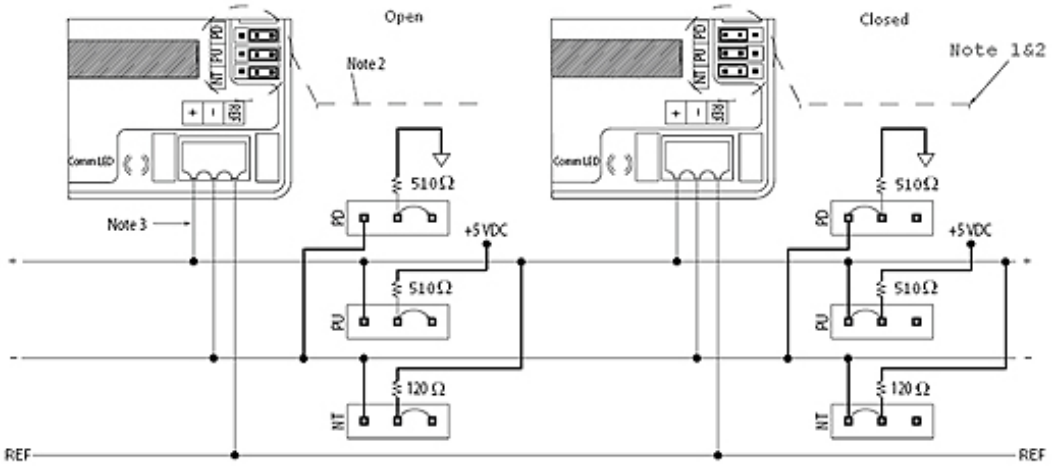


Figure 13: Sample Wiring Diagram to Modbus Network

Note 1: Biasing, circuitry, and resistors for PU, PD, and NT terminals are integral part of 340BN/MB transmitter.

Note 2: For the final 340MB transmitter in a given RS-485 network string, NT, PU, and PD jumpers should be in "Closed" position. Otherwise, NT, PU, and PD should be in the "Open" position.

Note 3: For the final 340MB transmitter in an RS-485 string, all three network terminals (+), (-), and REF should be connected to the buss. Otherwise, connect only terminals (+), (-) to the buss.

Connection to the RS-485 network should not be made until the 340BN/MB has been configured per the instructions in the "Programming" section on page 14.

See the “Connecting the RS-485 Network Configuration” Section.

Communications Cable Wiring

Field configuration requires a Badger Meter programming kit (consisting of a custom cable and software) and a PC running Windows® 9x, ME, NT, 2000, or Windows 7. In order to connect, the Series 340 BN/MB must be to powered, and the Model A301 cable must be connected to the Series 340 BN/MB COM port connector and an available 9-pin COM port on a computer. USB to COM Port adapters can be used if the DB9 COM port is not available.

> **NOTE:** The Badger Meter A301 Cable will work with all Series 300 products. However the older version of the cable (A300) does not have sufficient bandwidth to work with the Series 340 BN/MB Transmitters.

Badger Meter provides free programming software updates via the Internet for all of Series 300 devices. Go to www.badgermeter.com. Software update can be found in the Industrial/Impeller/transmitter section.

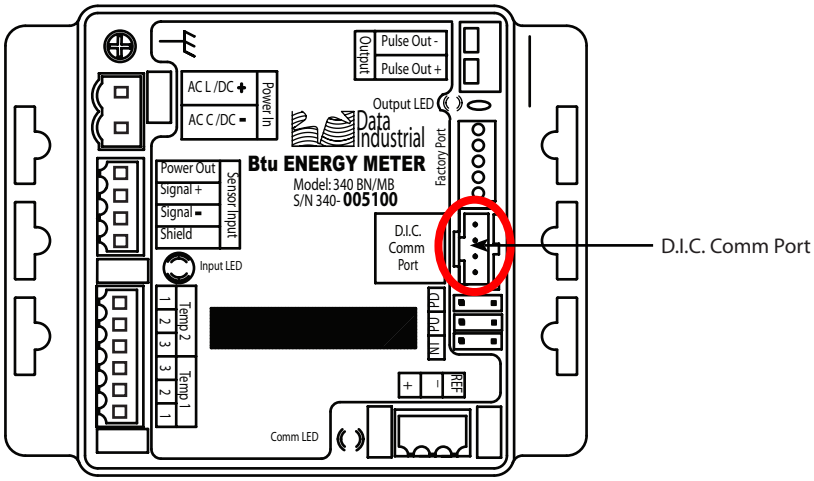


Figure 14: Location of the DIC COM Port

Programming

Making Connection Via DIC COM Port

Programming the Badger® Series 340 is accomplished by installing the Badger Meter programming software on a computer and entering data on templates of the Windows® based program.

1. Load the interface software into the computer.
2. Power the 340BN/MB with 12-24V AC/DC
3. Connect the computer to the Series 340 transmitter with the Badger Meter Model A-301 communications cable to the socket labeled "D.I.C. COM port", taking care to properly align the tab on the plug and socket to maintain polarity. Connect the DB9 connector of the Badger Meter Model A301 communications cable to a PC COM port that has the 340 software installed. If a DB9 COM port is not available a USB to COM Port Adapter may be purchased locally.
4. Open the program, and from the DEVICE tab select 340 as shown in the dialog box below.

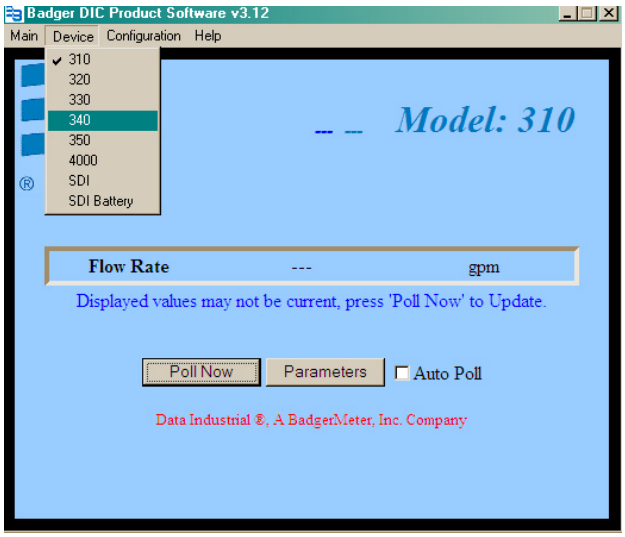


Figure 15: Select 340

5. After the 340 device has been selected, the specific 340BN/MB can be selected

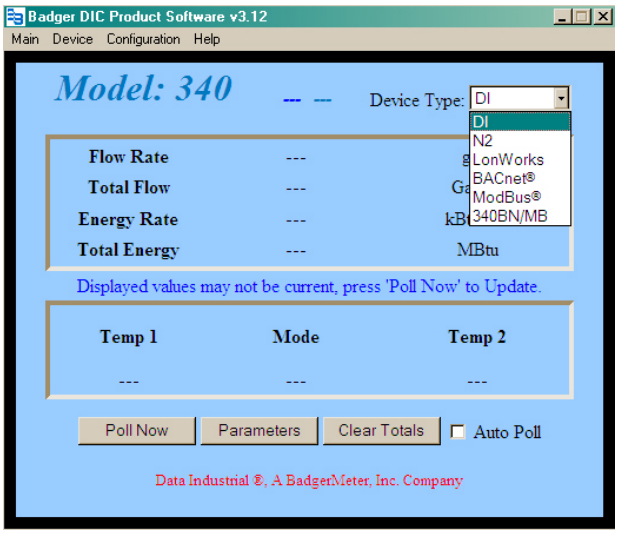


Figure 16: Device Type

6. Once the 340BN/MB has been selected the appropriate COM port can be selected from the Configuration Tab.

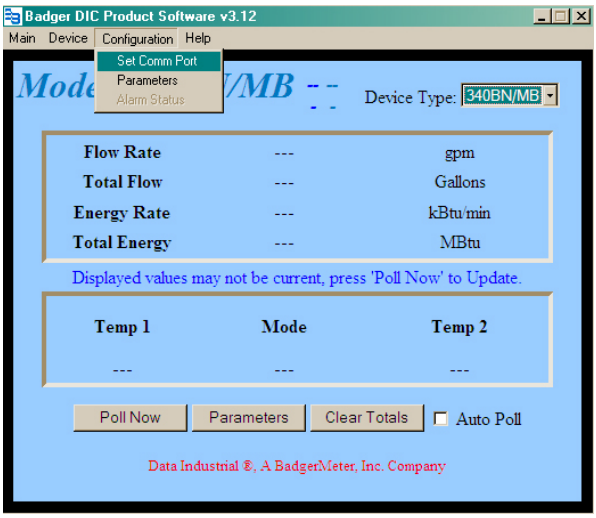


Figure 17: Select Set COM Port

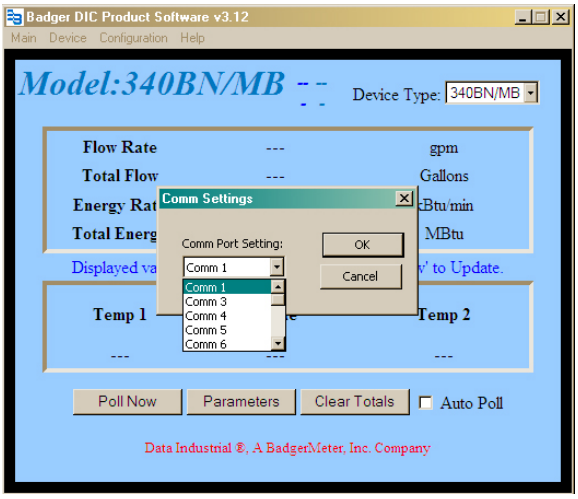


Figure 18: Select the COM Port

7. If the COM and Device type have been properly selected, the "---" will be replaced with values.

If this does not occur, communication has not been established, and you cannot continue to the next step. If it does not connect automatically try clicking on "Poll Now".

If communication still does not occur, and you are using a DB9 to COM 1 or COM2, try using a USB to COM adapter. This will usually create a new COM port that was not previously listed. Windows Device Manager can be helpful in determining the actual COM ports that are available.

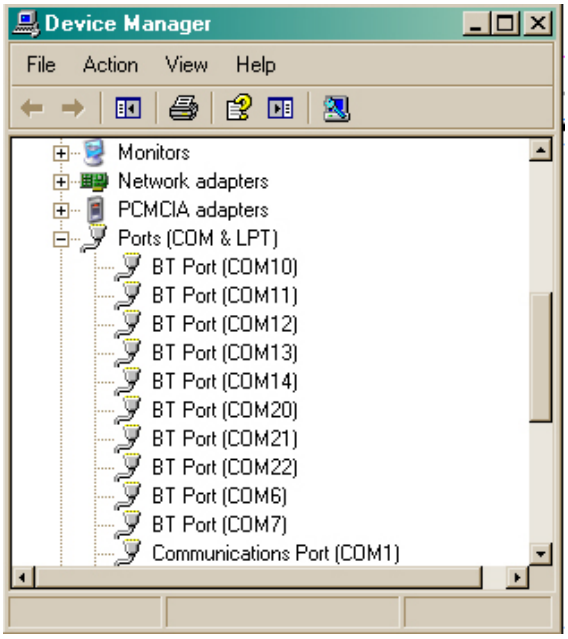


Figure 19: Device Manager

Select this new port created by the adapter, and the screen should change to as shown on the next page which will confirm normal communications.

Notice that the "---" are replaced with values. This confirms communications.

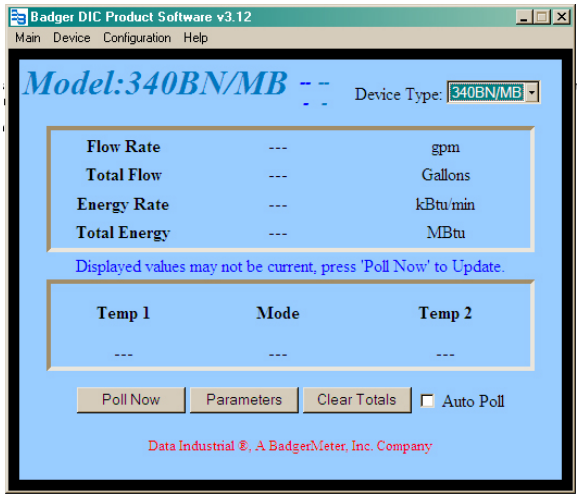


Figure 20: Screen Change

8. When communication has been confirmed, Click on the **Parameters** button.

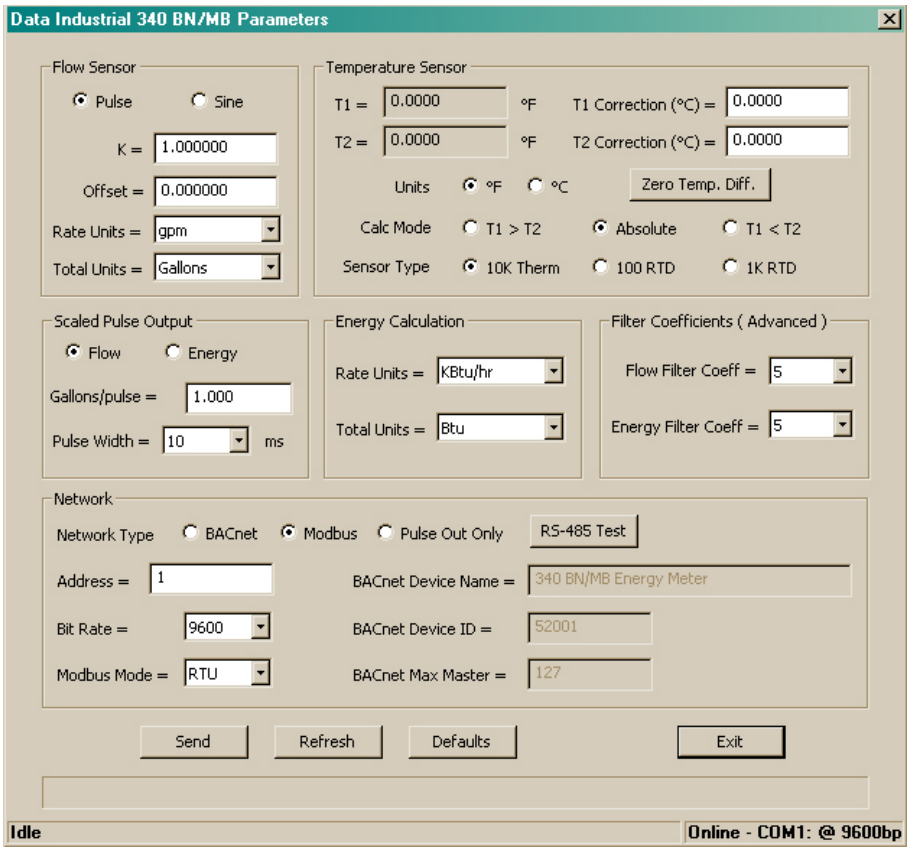


Figure 21: Parameters Screen

9. From this screen we will set up the following:

    1. Flow Sensor Type, Scaling, and units.
    2. Temperature Sensor Type, Units, Mode, and Zeroing.
    3. Energy Calculation Units of Measure
    4. Filter Coefficients (Flow and Energy averaging for reading stability)
    5. Scaled Pulse Output resolution and pulse width
    6. RS-485 Network Configuration (BACnet or Modbus)

Be sure to press **Send** before leaving this page to save any wanted changes. **Defaults** will restore all factory settings. **Exit** returns to the Main Screen.

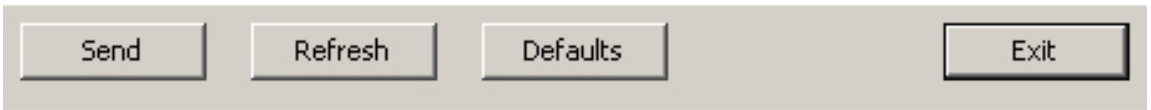


Figure 22: Parameter Screen Buttons

Flow Sensor Section

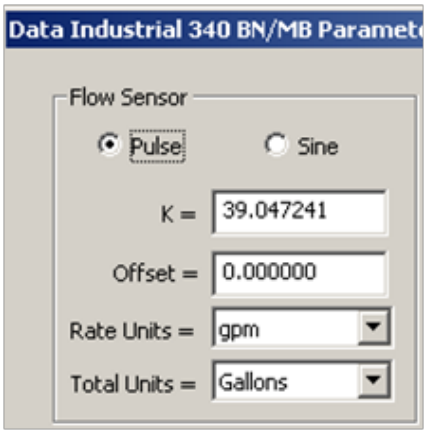


Figure 23: Pulse or Sine

For most Badger Meter sensors the sensor type is "Pulse", and the "K" and "Offset" values can be found in the respective Flow Sensor Manual.

"Sine" is used for zero-crossing flow sensors (some turbine meters, etc.)

Several flow rate and flow total units of measure can be selected from the pull-down menu.

Temperature Sensor Section

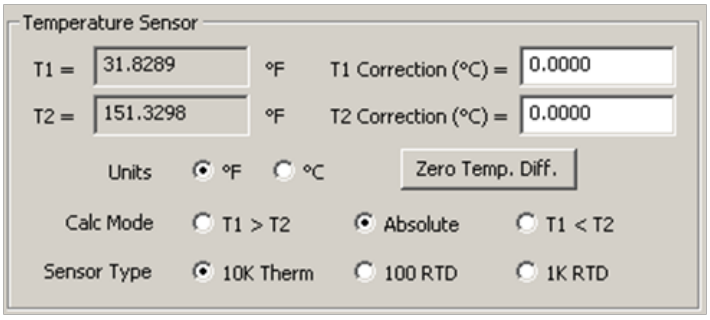


Figure 24: Sensor Attributes

First choose the sensor type (10K Thermistor, 100 Ohm RTD, or 1K RTD).

The calculation mode has three selections.

Initially, it is best to choose "Absolute." In this mode the Energy Rate and Total will be calculated as a positive value regardless of the direction of energy flow.

In the T1>T2 Mode, energy will only be calculated if the T1 sensor is warmer than the T2 sensor.

If T1 is cooler than T2, the energy rate will remain at 0.0, and the energy total will not increase.

In the T1<T2 Mode, energy will only be calculated if the T1 sensor is cooler than the T2 sensor.

The T1= and T2= are simply for reference to indicate the current temperature readings.

This is useful in using the zeroing Feature explained on page 19.

The "Zero Temp Diff" is a very powerful feature in this product which allows any inaccuracies of drift in the temperature sensors, or 340 temperature measurements to be cancelled out.

This correction can be either manually typed in or if the temperature sensors are known to be at exactly the same temperature, the "Zero Temp Diff" button can be used to automatically zero the difference between the two readings. To correct for any erroneous entries, simply manually type 0.0 in both fields.

This is a very powerful feature, but must be used with caution. If used incorrectly, the temperature readings will be incorrect and the energy rates and totals will also be in error.

Energy Calculation

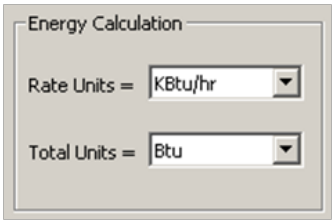


Figure 25: Rate and Total Units

Select the units of measure for energy rate and total from the Pull-Down menu.

Filter Coefficients

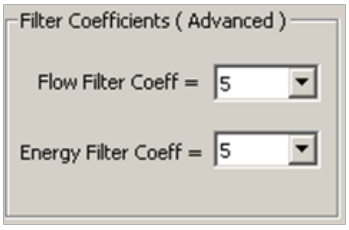
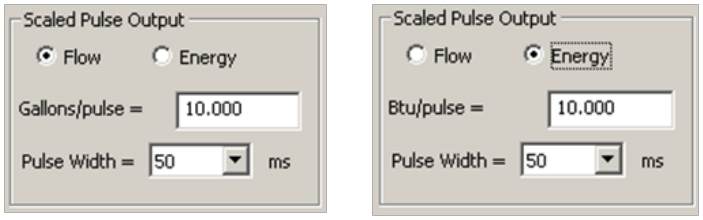


Figure 26: Filter Coefficients

For most applications leave the default setting of 5. If the Flow rate or Energy Rates are some reason unstable (from a disturbed flow profile for example). This value can be increased as needed.

Pulse Output



Flow or Energy

The Pulse Output can represent either Flow or Energy. Units will be the same as selected in the previous sections.

Pulse width, and pulse resolution will be selected based on the requirements of the receiving device, and system requirements.

RS-485 Network Configurations

The RS-485 Section can be configured in three ways:

- PULSE OUT only – RS-485- OFF
- Modbus
- BACnet

The following sections explain each in detail.

RS-485 Network Configuration – PULSE ONLY

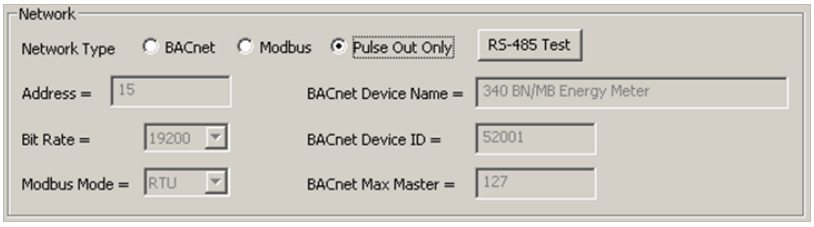


Figure 27: Pulse Only Option

If the Modbus or BACnet communications are not going to be used, the "Pulse Out Only" setting can be selected. This will disable the RS-485 Network.

RS-485 Network Configuration – Modbus

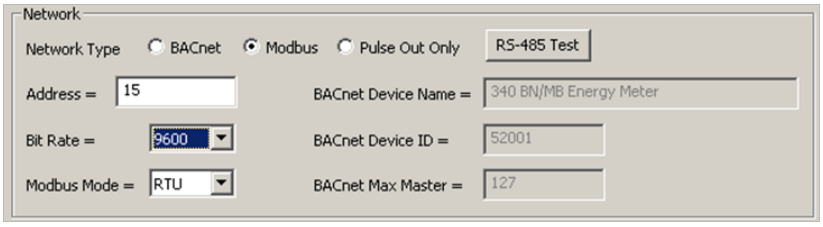


Figure 28: Modbus Option

Select Modbus, to access the Modbus pull down menus.

Select the BAUD rate, Mode (RTU or ASCII) and address.

The Model 340 uses IEEE 754 Float - Data Located in "Holding Registers"

The 340BN/MB Data Format is "Float 32" where the Data is Stored across two "Holding Registers".

In the case of Temperature 1, the Upper Byte is stored in Register 40002, and the lower Byte is stored in the Register 40001. Sometimes referred to a ABCD to CDAB format.

This is done to permit backwards compatibility with older 16 Bit Systems.

For example a temperature of 53.36°F when converted to IEEE 754 is "425570A4." So in the case of the 340BN/MB, Register # 40001 = 70A4 Hex and Register # 40002 = 4255 Hex.

Modbus Register Map

MODEL 340BN/MB Register Map			
Register Name	Address	Data Type	Read/Write
Temperature 1	40001 + 40002	IEEE 754 Float	Read Only
Temperature 2	40003 + 40004	IEEE 754 Float	Read Only
Flow Input (Hz)	40005 + 40006	IEEE 754 Float	Read Only
Total Flow	40007 + 40008	IEEE 754 Float	R/W
Total Energy	40009 + 40010	IEEE 754 Float	R/W
Flow Rate	40011 + 40012	IEEE 754 Float	Read Only
Energy Rate	40013 + 40014	IEEE 754 Float	Read Only
K Factor	40015 + 40016	IEEE 754 Float	R/W
Offset	40017 + 40018	IEEE 754 Float	R/W
Temp. Calc. Mode	40019 + 40020	IEEE 754 Float	R/W
Flow Filter Coef.	40021 + 40022	IEEE 754 Float	R/W
Temp. Filter Coef.	40023 + 40024	IEEE 754 Float	R/W
Specific Heat	40025 + 40026	IEEE 754 Float	R/W
Fluid Density	40027 + 40028	IEEE 754 Float	R/W
T1 A Coefficient	40029 + 40030	IEEE 754 Float	R/W
T1 B Coefficient	40031 + 40032	IEEE 754 Float	R/W
T1 C Coefficient	40033 + 40034	IEEE 754 Float	R/W
Temp 1 Offset	40035 + 40036	IEEE 754 Float	R/W
T1 A Coefficient	40037 + 40038	IEEE 754 Float	R/W
T1 B Coefficient	40039+ 40040	IEEE 754 Float	R/W
T1 C Coefficient	40041 + 40042	IEEE 754 Float	R/W
Temp 1 Offset	40043 + 40044	IEEE 754 Float	R/W

RS-485 Network Configuration – BACnet

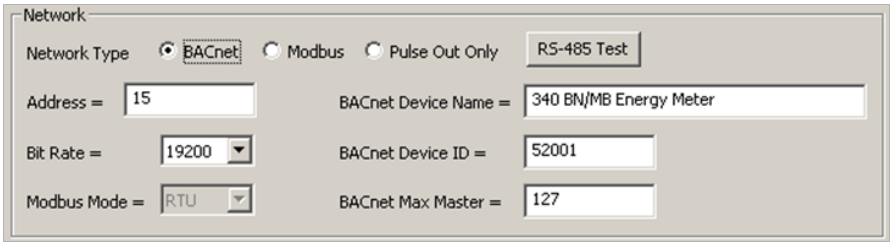


Figure 29: BACnet Option

Select BACnet, to access the BACnet pull down menus.

Select the BAUD rate to match other devices on the network.

BACnet Device Name can be set to help identify this device and location.

BACnet Device ID (Incidence #) is a unique number to identifies this device on the network.

Typically, the first part of the number is the same network #, and the last two characters are the same as the Address.

This is not a requirement, but can help in system planning.

BACnet Object Map

Description	ID	Name	Out of Service	Units
Analog Input	AN1	TempIn	FALSE	°C, °F
Analog Input	AN2	TempOut	FALSE	°C, °F
Analog Input	AN3	FreqIn	FALSE	Hz
Analog Input	AN4	VolFlow	FALSE	gpm, gph, lpm, lph, ft3/s, ft3/m, ft3/h, m3/s, m3/min, m3/h
Analog Input	AN5	EnrgyFlow	FALSE	kBTU/min, kBTU/h, kW, MW, HP, Tons
Analog Value	AV1	TotalVol	FALSE	gallons, liters, ft3, m3
Analog Value	AV2	TotEnergy	FALSE	BTU, kBTU, MBTU, kWh, MWh, kJ, MJ
Analog Value	AV3	Kfactor	FALSE	dimensionless
Analog Value	AV4	Offset	FALSE	dimensionless
Analog Value	AV5	TempMode	FALSE	dimensionless
Analog Value	AV6	FFilterCoef	FALSE	dimensionless
Analog Value	AV7	TFiltCoef	FALSE	dimensionless
Analog Value	AV8	SpHtCapac	FALSE	BTU/lb-F
Analog Value	AV9	Density	FALSE	lb/gallon
Analog Value	AV10	InTACoef	FALSE	dimensionless
Analog Value	AV11	InTBCoef	FALSE	dimensionless
Analog Value	AV12	InTCCoef	FALSE	dimensionless
Analog Value	AV13	InTOffset	FALSE	°C, °F
Analog Value	AV14	OutTACoef	FALSE	dimensionless
Analog Value	AV15	OuTBCoef	FALSE	dimensionless
Analog Value	AV16	OutTCCoef	FALSE	dimensionless
Analog Value	AV17	OutTOffset	FALSE	°C, °F

BACnet Protocol Implementation Conformance Statement

Products

Product	Model Number	Protocol Revision	Software Version	Firmware Version
340BN	8340BN	135-2001		Rev. 1.00

Vendor Information

Badger Meter Inc.
6116 E 15th St.
Tulsa, Ok 74112
www.badgermeter.com

Product Description

The Series 340 BTU Transmitter is a low cost, flow and temperature sensor interface used in sub-metering applications. An additional communication design feature provides connectivity for BACnet® MS/TP

BACnet Standardized Device Profile

Product	Device Profile	Tested
340BN	BACnet Smart Sensor (B-SS)	

Supported BIBBs

Product	Supported BIBBs	BIBB Name	Tested
340BN	DS-RP-B	ReadProperty-B	
	DS-WP-B	WriteProperty-B	

Standard Object Types Supported

Product	Object Type	Creatable	Deletable	Tested
340BN	Analog Input	No	No	
340BN	Analog Value	No	No	
340BN	Device	No	No	

Data Link Layer Options

Product	Data Link	Options	Tested
340BN	MS/TP Slave	Baud rates: 9600, 19200, 38400, 76800	

Segmentation Capability

Product	Segmentation Type	Supported	Window Size (MS/TP product limited to 1)	Tested
340BN	Able to transmit segmented messages	No		N/A

Device Address Binding

Product	Static Binding Supported	Tested
340BN	No	N/A

Character Sets

Product	Character Sets supported	Tested
340BN	ANSI X3.4	

RS-485 Network Test

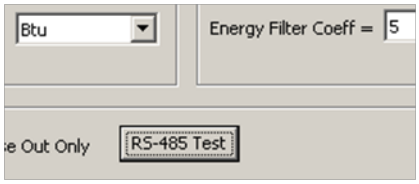


Figure 30: RS-485 Test

The Configuration Software has an RS-485 test program.

Although it uses Modbus settings, it is RS-485 communication it is testing.

The test requires connection to a COM port using the Badger Meter A302-20 RS 485 to RS-232 convertor cable. This cable can also be helpful with other diagnostics programs and devices that use an RS-232 port to communicate.

When testing the RS-485 network, it is sometimes helpful to connect to some other location instead of directly to the Model 340BN/MB. When testing in this way the RS-485 end connector can be removed, and the wires can be connected directly to the RS-485 pairs.

The following table may be helpful to make connections.

302 Cable -RS-485 End	340BN/MB	340N2	Series 3000
Red	RS-485 +	N2+	RS-485B
White	RS-485 -	N2-	RS-485A
Black	REF	REF	RS-485 Gnd

When the "RS-485 Test" is clicked the following screen appears:

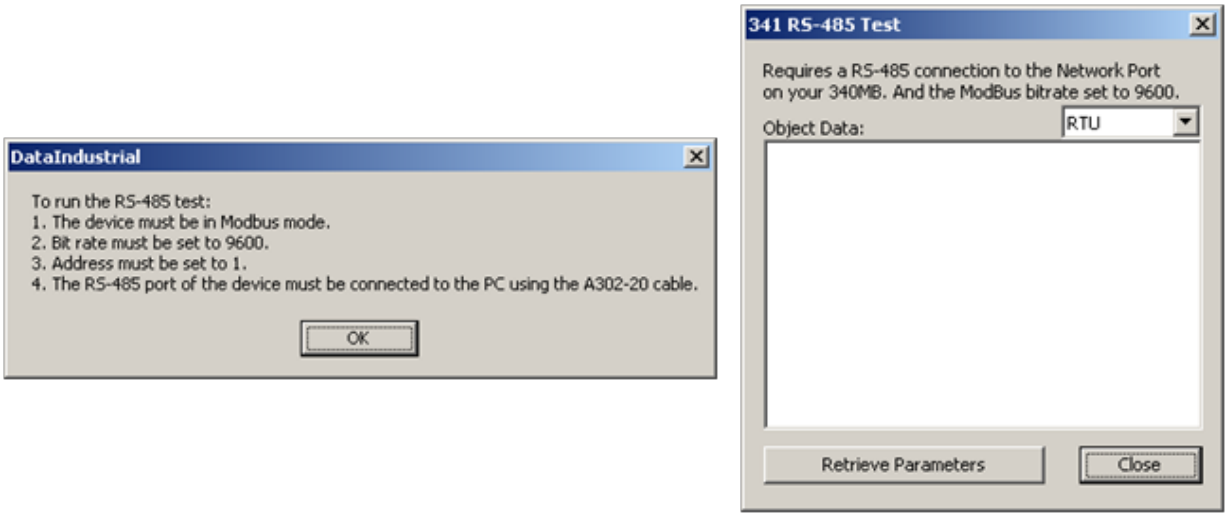

DataIndustrial
To run the RS-485 test:
1. The device must be in Modbus mode.
2. Bit rate must be set to 9600.
3. Address must be set to 1.
4. The RS-485 port of the device must be connected to the PC using the A302-20 cable.
OK
341 RS-485 Test
Requires a RS-485 connection to the Network Port
on your 340MB. And the ModBus bitrate set to 9600.
Object Data:
RTU
Retrieve Parameters
Close

Figure 31: Test Screens

Factory Default Settings

The table below is a list of factory default setting for all 340BN/MB variables. These settings can be changed by accessing the parameters to best fit your application, and if desired, recorded in the table for future reference.

Description	Default Value	Customer Value
Flow Sensor Type	Pulse	
"K" Offset	1	
"Offset" Value	0	
Flow Rate	gpm	
Flow Total	gallons	
Temperature	ºF	
Energy Calculation	absolute	
Temperature Sensor Type	thermistor	
Energy Rate	kBTU/hr	
Energy Total	BTU	
Flow Filter Coefficient	5	
Energy Filter Coefficient	1	
Energy Folter Coefficient	1	
MS/TP Address	1	
MS/TP Baud Rate	9600	
BACnet Device #		
BACnet Max Master	127	

Specifications

Power

Power supply options:
12-35V DC +/- 5%
12-24V AC +/- 10%
Current draw:
60 mA @ 12V DC

Flow Sensor Input

Pulse type sensors

Signal amplitude:
2.5V DC threshold
Signal limits:
Vin < 12V (DC or AC peak)
Frequency:
0.25-10kHz
Pull-up:
2 kΩ to 10V DC

Sine wave sensors:

Signal amplitude:
10 mV p-p threshold
Signal limits:
Vin < 12V (DC or AC peak)
Frequency:
0 to10kHz
Excitation voltage 3-wire sensors
7.0V DC to 11.4 V DC 500Ω source impedance

Temperature Sensor Input

2 required:
10 kΩ thermistor, 2 wire, type II,10 kΩ, @ 25°C
100Ω RTD, Platinum three wire,
1000Ω RTD, Platinum, Two or Three wire
RTDs follow IEC 751 DIN Curve @0°C

Pulse Output

Pulse width:
Programmable 10mS to 5 sec. in 50mS steps
Pulse frequency:
Max of 10Hz @ 50mS pulse width Programmable to scaling requirements of connected device (Flow or Energy)
Opto-isolated solid state switch
Operating Voltage range:
0 to ±45V (DC or AC peak)
Closed (on) state:
Load Current - 700mA max.
over operating temperature range
Open (off) state - leakage @ 70ºC
<1µA @ 45V (DC or AC peak)

Operating Temperature

-29° C to +70° C
-20° F to +158° F
Storage Temperature
-40° C to +85° C
-40° F to +185° F

Weight

4.8 oz. with connector headers installed

SENSOR CALIBRATION

Badger Meter
Use K and Offset provided in sensor owner's manual
Other Sensors
Check with factory

UNITS OF MEASURE

Flow measurement

Rate:
gpm, gph, l/sec, l/min, l/hr, ft3/sec, ft3/min, ft3/hr, m3/sec, m3/min, m3/hr
Total:
gallons, liters, cubic feet, cubic meters

Energy measurement

Rate:
kBtu/min, kBtu/hr, kW, MW, hp, tons
Total:
Btu, kBtu, MBtu, kWh, MWh, kJ, MJ
Temperature Units:
Fahrenheit, Centigrade

PROGRAMMING

Requires PC or laptop running Windows® XP, Vista or Windows 7
Badger Meter Model A-340 programming kit containing software and Model A301-20 programming cable

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for specific contacts.

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